DNA Replication

Components of DNA Replication in Prokaryotes

DNA replication is a complex process involving a great variety of enzymes and proteins.

a) DNA – A Protein - Responsible for the localized strand separation at Ori C (Origin of replication). It is an ATP requiring process, causes double stranded DNA to melt forming single stranded DNA.

b) DNA-C Protein – Joins the initiation complex and contributes to formation of two bidirectional replication fork.

c) DNA Helicases – It unwounds the double helix using energy derived from ATP, hence creating single stranded DNA.

d) Single-Stranded DNA Binding Protein (SSB Protein)

SSB Protein keeps the unwound DNA strand in an extended form. i.e., it maintains the single stranded form for replication.

e) DNA Topoisomerases – Responsible for removing supercoils in the helix.

f) RNA Primers :- RNA primer is a short double stranded region consisting of RNA base-paired

to the DNA template with free hydroxyl group on the 3' end of RNA strand. This hydroxyl group acts as first acceptor of nucleotide by action of DNA polymerase.

g) DNA Polymerase: DNA is replicated by enzymes DNA Polymerases.

Features of DNA Polymerases.

- These enzymes utilizes single stranded DNA as template on which complementary strand is synthesised using appropriate deoxyribonucleotide triphosphate (dNTPs).
- All DNA polymerase have an absolute requirement of a free 3'OH on the primer strand and all DNA synthesis occurs 5'→3' direction. They are able to read parental nucleotide sequence in 3'→5' direction
- All DNA polymerase requires a primer strand.

Types Of DNA Polymerase:—

i) DNA Polymerase I (DNA synthesis, Proofreading)
ii) DNA Polymerase II (DNA repair)
iii) DNA Polymerase III (Chain elongation, Proofreading)

✓ b) DNA Ligase: It catalyzes the covalent closure of ~~nicks~~ nicks in DNA. It plays an important role in maintaing genomic integrity by joining breaks in the phosphodiester backbone of DNA that occur during replication.